Francis R. Upton Notebook

This is the second of two notebooks used by Upton in November and December 1878 to conduct a literature search for the Edison Electric Light Company. Upton searched through patents and journal articles for information about arc and incandescent lamps. The pages at the beginning of the book contain a chronological account of attempts to devise electric lights. Near the end of the book are a few notes from patents and journal articles concerning carbon lamps. The front cover is labeled "H," and the first page is inscribed "History." The back cover is labeled "M," and the last page is inscribed "Materials for Carbons Outline for History." The book was used in both directions. The pages in the front of the book are numbered 1-92; there are also 13 unnumbered pages. The pages in the back of the book are numbered 1-20.

Blank pages not filmed: 25-28, 32-33, 35-38, 44, 46, 50, 56, 83, 88 [front]; 12, 18-20 [back].

Frazier p. 60
Grove p. 18
Mechanical Equiv. p. 11
Dumas 47

Cabinet 109
Shelf 1

34 W 15 St

15000
500

30
900

History

C Goddard
Secty
3 Broadway
Room 44

Arc of four inches in air in vacuum of sewer.

1800 Curtet observed the light which could be obtained from carbon pts Berlin ~~Handwörterbuch~~ 1855 713 Vol VI

according to Quetlet Curtet observed the light with carbon pts. in 1800 ...
Wied. Galv. Bd. I 783 Eng Ref

For account of heating wire De la Rive Vol II p. 205

Sir Humphrey Davy, about the year 1813 discovered "the voltaic arc". Battery of 2000 frs. each surface 32 sq. in. Zn. & Cu. Acidulated water. Eng Abridge. Vol I pp. LX

see Davys Elements of Chemical Phil. pp. 152-~~44~~ 154. 1821

De la Rive Treatise on Elec ~~Vol~~ Vol II pp. 282-283

Ency. Met. Galvanism Vol IV pp 176, 178, 222

1819 Hares Calorimotor
Ency. Met Vol IV pp 222
Gmelin Handb. Chem Vol. I. pp. 409, 410,

1820
Sir Humphrey Davy
rotation of arc of Electric light by magnet.
E. Mag. Vol IV. pp 9.10.

1821
Hare's deflagrator

1836. Daniells
Fused Titanium with 70 cells
heated 11 feet 4 in No 20 Pt wire.

Ency Brit. 7 Ed.
Voltaic Elect. pp. 669-671
Gmelin Handbook Chem
Vol 1. pp 393. 421
Bakewell's Electric Science
pp. 43. 106-107.

1837 Dr Andrews
Phil Mag June 1837
Vol X. p. 433.

1845 M. Heider employed pt. wire to cauterize.
De la Rive. Vol. III p 687

1848 M. Foucault
De la Rive Vol II pp 326.328.
Vol III pp. 310-315.

1855. Dr. Middeldorpff. Brodau
~~1848~~ published on Galvanic Cautery
De la Rive Vol III 687-690

1858 Matthieson
Wales Hamilton Butler Van Antwerp Wolcott
hot
1882 Shelton Electric Light
Phil Trans. 1882 599
" " 989

Dr. Van Nostrand Authorities
Sir La Rive $ 36.50
Du Moncel $ 22.40
Noad $ 12.
Roux $ 2.00
Lumiere Electrique appliquee à la navigation .50
Becquerel $ 36.25
Fontaine
Electric lighting

In Encyl Britannica
Young's Nat. Phil.
Mascart new work
Nature Sept 1877
Jablochkoff

Sabe chloride of Silver-
battery.

between plates carbon with moist
end with chloride of Zn.

~~Mallet~~ France
1851 Mallet 24-259
By burning gas produced by
electric current
No drawing of light and
10 pages of something tiny to.

France

24 – 276 – 1474

Gaby Cazalat.

H from Zn and H_2SO_4 burned

"Costs nothing" — Foolish.

value of H = 0

1852

24 345 Watson and Slater p 14

1857 63 – 219

Pulvaje & battery

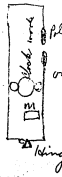
1858 71 – 56

Shepard probably foolish.

Hg. H_2O complicated. Ill.

1858 71 174

Simin. oscillating regulation

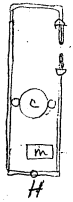


Thrown into gear on one side another by magnet thus raising or lowering.

Idea good the beginning of a new era

1858 71. - 174 6

Lenin



Poles on frame work hinged on H

C - Clock - work

Magnet

Authorities Fontaine

Regulateur Gaiffe

see. Figuier Les Merveilles de la Science t IV p 225

Fontaine p. 25

~~Wiedemann~~

1821 Phil ~~Tran~~ Trans. Vol. 1 p 7 v

Davy account of heating wires

1815 Children Vol. II. p. 363

The same

1841 Joule Phil. Mag. p. 260 / Vol XIX Experiments on wire p 52

1843. E. Becquerel Archives T III p 181

Ann. de Chim. et de Phys. [3]

T IX p. 21 1843

1859 Jöllner / Baseler Naturforschungen [3] ~~Bd~~ Bd II V. 211 Vit-light from Pt. wire.

Journal of the Society of A — 1876 p. 98

Prof. Cornell to S — A —

Brayton oil engines 6 3/4 lbs per hour 2 3 4 lamp power

2 3 4 lamp per required 16 lbs petro per hour

J — S of A — 1877-981

Account of Mm. Jablochkoff's experiments

Bulletin de la Société d'Enc —

Nov 1867 & Dec 1867

Electro-magnetism a full account of what had been done to date by Mm. Le Roux.

Bulletin d — S — d E —

M. Liscajous gave a short summary Jan. 1868

De la Rive speaks Vol 1 p 32
of Voltameters made from Pt wire, expanding under heat

also in vessel of gas or differentially expanding tube or sphere

1840 —— 1850

see page 50

Before Lissajous 1842 there was needed?
1. a convenient battery
2. Carbons which did not burn away rapidly.
3. a mechanism for regulating the movement of the poles.

Mr Lissajous gives much credit to Mm. Foucault for 1844 the instituted electric microscope.

Dubosq 1849 Ferrin
Opera Apr. 16 1849 le Phosphate

Le Roux 1868 p 419.
B. S — dle

Comptes Rendus d l'academie des Sciences. tome 74 p 1338
to 75 138 627 825

Jim 1878 Comte du Moncel
B — S — dE —

See Baille ~~the~~ L'Electricité for account of lamps in theatres and public places in Paris. Very popular and good.

Dingler Polytechnisches Journal 1871 No. 6. Page 50 2
used in illuminating statue of Victory in Berlin

Phil Mag 1847
De la Rive Voltaic arc

P M. 1853
Prof Wartmann Geneva
50 Burners. Assistants eyes injured
arc established by a spark

see Poggendorff 1858 No 8 650
metal resistances

Lighting under water.
Comptes Rendus

Mechanical equivalent
Thomas Poggendorf — Annal
June 1865
Phil. Jour. 1865 - 246
Estimates that the heat given out in a Francis candle is 350 in gas flame 1000 times more than the light.

Unit of work kilo. Metre in one second. The equiv. of the light of one candle burning 8.2 grams an hour is $\frac{1}{34.9}$ K.M. per sec.
or 34.9 candles gives out in light one unit of work.

see also Silliman's Journal
March 1866

His method was by using a thermo-pile and passing the light through 0.2 Metre of H_2O wh. absorbed all the heat and only 13 per cent of the light.

He used a glass globe filled with 1351 grms warm water and noticed rate of cooling using Dulong's formula.

Light of flame of one candle 8.2 grms per hour = energy 4.1 grms H_2O 1° cent. in one minute

1 K M = 7.233 foot pounds

1 Horse power = 33,000 foot lbs per minute

light of one candle does $\frac{1}{34.9}$ K M per sec

$= \frac{7.233}{34.9}$

$$\begin{array}{r} 0.859332 \\ 1.542833 \\ \hline \bar{1}.31649 \end{array}$$

= 0.207 foot Pounds per sec

.207 X 60 = 12.420 per min.

$\frac{33,000}{12.420}$

$$\begin{array}{r} 4.5185 \\ 1.0941 \\ \hline 3.4244 \end{array}$$

2652. candles from one horse power theoretically

Wilde Phil Mag. H. Wilde
Aug 1867
on research on magnetism and electricity

Edlund Poggen Annalen
No 8 1867 Phil J — 1869
103
Investigation of the electric light
Work of current

Proceedings of Royal Society
Dec. 17 1868
Crookes Phil - J - March 1869

Royal Society Apr. 27 1871
Charles William Siemens
on the increase of resistance with temperature

the same
Phil Mag Jan 1875-79.
refers to Bibliothequ Universelle
Archive des Sciences Physiques et Nat 51-284-287.

Franklin Journal 1840 speaks of
of Bequerel exhibiting to
the academy of Science Paris.
A Pt Wire placed in communi-
cation with two poles of
~~of~~ a voltaic bat — becomes
red hot in a portion of
its length. If that be twisted
spirally all the heat is then
concentrated in the interior of
the convolutions. If a very
small crucible be placed
within the folds of the wire
the greatest conceivable effects
of fusion are produced —
even the Pt. itself may be
melted

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1849 Grove. Pogg. Ann. LXXI 194
Phil Mag XXXV 114
Pogg Ann LXXIII ~~366~~

an account of the decomposition of gases in presence of an electrified wire. Also the effect of H in cooling Pt in it.
See Be la Rive

1849 Mr. Grove in lecture before Royal Institution spoke of cost of the light. And calculated expenses by means of a Voltameter and the estimating materials required. Theoretical expense 50 cells 14 H2O4 Pt. plates 4' by 2 12 shilling per hour actual about 4 shilling
Light = 1444 was a candles almost. central illumination very bad. E-S- good for light house.

Journal of Franklin Inst 76

1842 Mr. De la Rive read paper suggesting lighting of mines by electricity. Comes of Carbon used

Third series Vol. 12. p. 52 Mr. De la Rive found difficulty in producing arc for light see Comptes Rendus 1 and 15 Sept 1845. Grove suggests in the Phil. Journ for 1845 Vol XXVII p. 442 the use of pt. spirals for light. speaks of common lecture room experiment of igniting a platinum wire. He says My plan was ~~to~~ then to ignite a coil of ~~Pt~~ Pt wire as near to the point of fusion as practicable

Mr. Grove states:
"The helix form offers the advantage that the cooling effect being lessened, a much longer wire can be ignited from the same battery; by the increased heat, the resistance is still further increased, and the consumption still further diminished, so that, contrary to the usual result, the increment of consumption decreases with the exaltation of effect produced." "The light is perfectly constant, subject to no fluctuation or interruption, and the heat is so excessive as to destroy the apparatus.

in a closed vessel of atmospheric air, or other gas, and the following was one of the apparatus which I used for the purpose; and by the light of which I have experimented and worked for hours. A pt wire dip two or three ~~feet~~ having nitric acid combination. (Grove)

I inclosed in tube because more light was thus obtained (Mr. Faraday first suggested this to Grove)

He speaks of difficulties met with in obtaining constant arc, but that he had a light burn for 4 or 5 hours.

Franklin 1848 Journal Vol XV pp 445-8
Mr. Starte gives account of his
electrical light in
Civ. Eng. & Arc. Journal.
consumed only $\frac{1}{7}$ lb zinc per hour
much cheaper than candles

Starte's Patent in F — J
Vol. 17 p. 263

Lighting work Comptes Rendus
May 1854

Bragonel 1858

Cosmos Nov. 1859 n.s.
account of E — L — in light
houses

loss of light by glass shades 19
William King
from Rond. Jour. of Gas lighting 20/92
Clear glass 10.57 p.c.
Ground glass (entire surface ground) 29.48
Smooth opal 52.83
Ground opal 55.85
Ground opal with painted figures 73.98

Thurneen estimates loss H_2O and glass as 13. p.c.

Faraday on Ex R. Franklin Journal
Vol 40 pp 44-147 1860

Wayo Electric light 1861
F - J Vol 41 p 114

In 1861 the electric light was used with Serrin's regulator in various parts of Paris. The success was fair on some of the large squares. Also used on indoor Water. F. J. Vol 42 p 282

Journal 1862 F. J. Vol 43 p. 357

A short account of E. L. Faraday had used the lamp with success for lighthouses.

800 candle power with battery costs $3.00 per hour
with magnetics 60¢ per hour

Speaks of Bakers patent machine upper carbon held by ring and as burning feed

Ring a little too small for carbon

London Athenaeum Nov. 1862

1857. Prof. Faraday and Prof. Holmes prepared a plan for electrical lighting for the Trinity houses. 1858 trial unsuccessful. 1859 a thorough trial was given and 1860 adopted for the South Foreland lighthouses. Gives full account

---

London Athenaeum Jan 1863 Prof T. H. Holmes gives clearly the advantages of using the electric light.

Franklin Journal quoting from
Lond Mechanics Mag Aug 1862 on
the Camphin revolver

about 1730 ~~sparks~~ Hauksbee sparks

Dufay in France sparks. Leyden
Jar. Dancy.

Pros. Society of Arts Dec 2. 1863
1864 Franklin Journal Vol 48 - 409
a full account of the use of the electrical light up to date in the
light houses in form of discussion.
Dr. Gladstone stated Holland
and France had worked on same
problem but that Brazil had a
light next to England probably
He gives Mr. Holmes great credit
as the first to use a magnet
to machines to produce the
light. Expense and methods
are fully spoken of

Tyndall speaks of the heating effects London Chem. News 271.
Franklin Jn Vol 49 P. 370

Pneumatic regulation F. J P. 179
Franklin Journal Vol 51 p 185
It is stated that in France the Right does not work as well as expected
Electric light = to
125 standard burners of Gas
oil = 23 " " " "
Elec cost 3.84 per burner
oil " 1.52 " "

1883 Phil. Mag. Vol. 15 p. 32

Editor made Franklin Jn Vol. 53 p. 259.

by Prof. Morton he speaks of Faraday

suggesting the carrying of the current

about magnet to render it stronger

1875 Journal L - J — 29

Vol. 64 P. 233 Lady gunns discovery mentioned of heating carbon

1876 J. of 7-8 - Vol 71 p 273
from Builder Apr. 1 1876 38
Great Northern R. R of Francis
account

Journal for Gas & Water Supply
1876 speaks of the mills at Müh-
hausen lit by elec
J. of 7-8- Vol 71 p 23
from Electrical news of Nov. 1 1875

1877 J. of F. I.
Aug p. 142 Jablochkoff Indorses
refers to not mine experiments
Eng. Mechanic June 15 1877
J. of Soc of A. June 29 "
From June 30

1877 Exeter first recognized the
value of E. R. in refineries & long
gas works until experiments
had been made.

14th Letter in J of F. I. Sept 1877
p. 158 describing the lighting sys-
tem used in a R. R. Tunnel
at Paris.

A fine account of "lighting by
Electricity" in J. of Soc of A.
Vol. 25 p. 976

Position Mail Geo Lighthouse Journal 1878
34

The electric spark first remarked by Otto ~~#~~ von Guericke Magdeburg in the last half of the 17th Century

"The physician Sulzer published an experiment, childish in its appearance, but made ground by the consequence or consequence that have been added to it. Two pieces of ~~metal~~ different metals, moistened by the tongue at one end and touched ~~to~~ the eyes, where that of the other gave the impression of a luminosity.

Third Spirit of Encouragement. or History of Electricity in the case of the Lithoxy

Shell B

In the year IX the citizens
"Fourcroy, Vauquelin and Thenard
were rewarded with the Legion of Honour for a discovery the most
curious and useful of the nearly Galvanic
ic discoveries. That no matter how many
small piles there may be no heating effects
are produced
Fourcroy in experimenting noticed
that large plates ~~made to~~
were better for fusing though they
gave no shock. The repetitions
affirming this. Ann. de Chim 39-103
Van Marum experimented in same
line Ann. de Chim 40-289
fused iron wire in 1801 and used
it as a test for arranging his
batteries

General remarks. De la Rive &c

40

A full account of the heating properties
of the current bringing down to 1855
also a full list of authorities
Encyclopedia Brit, Vol XXI p. 626
Soon after discovery of the pile va-
rious observers noticed that thin
leaves and fine wires of metals
were fused if put in the circuit.
That the size of the plates and
number of them had great influence
on this phenomena was ~~the~~
first noticed. By measuring
both of these ~~—~~ at the Royal
Institution very brilliant re-
sults were obtained. With a
32 inch aggregate
pile of 2000 couples Sir H.
Davy could study ~~this the~~
~~compounds~~ the lighting and
heating properties of the
current to great advantage.
In 1813 the light between
two charcoal pts. was ob-

tained having a heating power.
The most refractory substances were melted. Water of boiled down
Mr. Children experimented from 1809 to 1815. He was enabled to bring a pt wire five or six feet long and a $\frac{1}{10}$ of an inch in diameter to a bright red heat. He also fixed the heating power of the current in various metals. Dr Wollaston made a pattern in a thimble and fused wire $\frac{1}{40}$" long $\frac{1}{3000}$". The thimble was flattened and a piece of gn. 3/4 of an inch square used.

Engy. Brit.

Staite and Petrie first 42
Lowenult about same time

Boston Brothers, Dubrovnik, De Bretti
Lucas made apparatus
Light. Blind may be induced
read by using cartons of colder
wood.
Employed optical Exp. submarine insulated with gutta
percha. Comptes Rendus 1884-38-813
39 1165
Bonssingault and Delahaye for
miners. Hefner. Grove &c
Pot wire used in astronomical
instruments ... teng. from exploding cartridges

Biot Ann. de Chimie 1820
Vol. 5 3 p 321 1805 43

Thinks that the light from the spark and its various effects were from the explosion of Electricity proving it by the effects that we explain as following the intensely heating of the air.

~~1824~~ Glasgow Mech. Mag Vol. 1 p 373

It is proposed to light houses and streets with the discharge through tubes. The writer asks who would have thought twenty or 20 years ago of applying to light cities with the jet of H which used for that purpose; the old philosophers lamp.

Mr. Weeks in Mech. Mag. for June 1831 suggest the oxyhydrogen lamp for illuminating, and I say, "on an elevated station, under proper management it might enlighten the whole town".

18.39.
65

1834, 864
M. Dumas, Bulletin de Soc. d'Enc. 47
T XI p. 472, in his report
awarding a prize of 50,000 francs
to Mr. Ruhmkorff, makes the
following remark. Davy
with a battery of 2000 cups
representing a surface of metal equal
to 100 square metres, obtained
a dazzling light and could separately
the carbons 11 centimetres before it
disappeared. Davy seemed to
have no idea that the light
could have any practical value.
Mr. Dumas repeated the experi-
ment in his lecture room, and after
saying that the light cost then
30 francs a burner each minute,
he yet declared his belief that
the day would yet come
when the employment of
the electric light, notwithstand-
ing, would equal other

methods of illumination; this statement was then received with a general laughter of incredulity

Mechanic's Magazine Sept. 23, 1837
Vol. 27 p. 424 48

"A Chemist having found, after many
"experiments that a void produced
"by electricity in a glass vessel
"became luminous, has at last
"succeeded in forming a long bottle
"of 3 inches by 30, from which
"having exhausted the air, and
"otherwise acted upon it by the
"galvanic battery, a light is
"now emitted, being hung
"up in his apartment, equally
"clear, but not so offensive
"to the eyes, as that of the sun
French Papers.

This was one of the first, the first I have found, of many wild accounts telling how rooms were to be lighted.

1839 Sir John Herschel took pictures by the light from Daniells great battery March May 3. 3-432.

1840 49

See Page 15 from Bacquerel exhibiting spiral.

Page 9 for ~~results~~ the various failings that must be remedied before the E-b could prove of practical value.

The carbon would bend and change under the heat. The diamond was also experimented on. An ordinary bell jar was also used to exhaust the air, 10 litres.

The carbon cylinders used were from 2 to 4½ centimetres long and 2 mm. thick.

Poly. Jour. V.115 p. 271 51

Comptes Rendus Dec. 1849 m. 25

(Desprez) Desprez

A thin rod of carbon by placed in a receiver and current from 60 Bunsen cups passed through it. The receiver was so arranged that the air could be exhausted from it and it the filled with any gas wished. Nitrogen was found to give the best results. Under heat the carbon first turned to graphite and afterwards volatilized after continued heating. He used fastening of carbon to fix the pencils of carbon.

See Konn. S p. 3

Sawyer R p. 26 where Dubos is Sawyer now

Kvalroff S p. 4

The light is spoken of as being remarkably brilliant and painful to the eyes.

Joule Phil. Mag. Vol 19 p. 260. 1841
52
Shows that heat evolved is directly proportional to resistance and as square of intensity of current, in the case of metallic conductors.

1881
53

1882
53

De la Rive nugget lighting mines by electricity p. 16
This notes again suggested by Rousseau
gault see 1845 p. 58

Dingler 91 324 1848
Moniteur industriel No 766 5.4
Delenil used Davy apparatus on the
Pont neuf in Paris with 98 Burner
48 Burner 572 Candles
Shadows and expense The light
~~was~~ measured by reading ~~[illegible]~~ at
distances
an account of the Experim
ment of Mm. Archereau in (Mech
Mag 39 - 352 ' 1843). He lighted
the Place de la Concorde with
his lamps. mentioned as a
substitute for gas. Easy to
read small print at distance
100 yrd Paris Papers

1894
55

Transcribed new cartons
Compt. rend. d l'Acad. des Sciences
Vol 18 (XVIII) p. 696

1845
57

Dingler 95 291
Technologiste V 115
Deleuil and Archereau. 200 Burners in Paris with Bourquard "Devouers tombs" for calling attention to the

---

Dingler 97 192 Technol 1845 402
~~Lo~~ ~~Hum~~. Weekes proposes the burying ~~the~~ large plates of Zn and Fe. in the ground, and thus have a constant source of Electricity ~~to~~ draw on. 80,000 or 100,000 thus buried and ~~light~~ wires carried ~~to~~ to top of the buildings, thus doing. the light should be called "the light of the Nations."

Brien Eng Patents 1843, No 9745 has similar plan of burying plates in the earth.

See Page 16 Grove 1845

De la Rue claims having worked on the problem of supplying miners with the electric light, though he had not found a form which was thoroughly satisfactory.

Dingler 198–158

Bouvingault suggests the same and De la Rue claims are in the form of a letter to him

Mech Mag. 44–349

An account of Staats lamp as patented by King claiming priority to Grove and especially the use of carbon.

Staats patent was sealed Nov. 26 1845 in Scotland

Grove Dec. 1 1845 published.

1846 Mech. Mag. 44. 315.
King's Patents. Project of lighting from Electricity now a favorite one, not unfeasible to the hopeful from in this invention.

De la Rive and Grove referred to for lighting mines and long extract given

De la Rive Comptes Rendus Sept. 15,

Year Book of Facts 1846 states that it was proposed to light the city of Cincinnati from two towns and sufficient to illuminate the whole city

See p. 92 H

Mechanics Mag. 45-160 Aug. 15 1846.
"We have another, in Mr Staite's patent, attempt to realize that favorite speculation of the day — a lamp which shall burn without air or oxygen, and be fed by that mysterious agent which we call electricity. Not long ago we gave a plate for the purpose of Amerikan origin, patented in England by a Mr. Ising, and felt obliged to speak of it in terms which have not been gainsaid by any thing we have since heard. The present shows a more promising aspect. It shows at least headed reasonability"
see M p. 5

Shaik in lecture at Cumberland say that his light = 300 candles consumes 3/4 lb of gas per hour.

E. L costs	1d	per hour
Gas	6d to 8d	"
Candles wax	12 a 6d	"

Smelting can be done so cheaply by Electricity, say a London Journal Journal, that the changes will be prodigious. 2 days required instead of 2 weeks. In Swansea annual saving will be, no less than 500,000 lbs of coal a year &c

Penny pieces will be size of dinner plate! Athenaeum 1018

Phil. Mag. Vol 30 p 345 1847

60

Prof. Draper gives his experiments of measurement of Pt. He estimates the highest at 2590° F that he measured. The intensity of the light at 2015° was taken as .62, at 2590° its was 12.34. "At 2590° the brilliancy is more than thirty-six times as great as it is at 1900°." He used thermopile for the heat which did not increase in any means the same ratio as the light has. He says in closing after speaking of the arm he used for indicating ex pansion. Says a light of standard intensity is wanted in optics and "An ingenious artist would "have very little difficulty, by "taking advantage of the "movements of the lever, in making a self acting apparatus, in "which the pt. should be maintained "at a uniform temperature, notwithstanding any change taking place "in the voltaic current."

Jahresbericht über Fortschritte 1847 61
1847 - 1848 p 300 - 314
an account of heating wires and of
the light for those years

Mech Mag. 46 June 30 - p 621
Mr Stirling perseverings and obtaining the
first practical result. Account general.

Mech: Mag: Full account 1848
carying Mr. Ploute worked out 62
his improvements single handed

In Oct 1848 Gas ~~Lowe~~ stocks fell
20 or 30 per cent. 2/3 of their value.
Created according by Mr. Rutton by
a few cleverly written articles written
for the newspapers

Quoted in Gas Journal

1848 91205
Athenaeum 1108 p. 71
Mr. Staite battery not promising, cost
two great
Athenaeum for Aug. 21 p. 413. The novelty
of the electric light Staite & Molloy
passed away "and the gaslights now
shine in their original brightness
no longer jeering the eclipse with
wh. they were threatened. For
the present be-L. gone and from
amongst us. Mons Archereau and
Foucault experimenting astonishing
Paris with exceedingly steady light.
Thought cost too great.
Quetlen quoted in Gas Journal Dec. 2, 1878.
says that in Oct. 1848 Gas Journal
See p. 51 for account Respighi's
experiments on melting carbon

1849
R. p. 89 Mr Foucault asks for a commission 63
Jan 15 to decide on his invention
as distinct from Mr. Staite's
He gives account of Mr. Staite —
invention Illustration Anglaise
for Nov. 18 1848. Mr. —
carbons were held in place
by wheels and detent
released by a magnet in air —
Comptes Rendus XXVIII 698
R. p. 9 Same vol a word about the commission 698
— The Commission allow that Foucault
indisputably invented an appa-
ratus, which was a complete success.
— a damning Page 9 Bulletin.
"De la Rive remarks (Arch. pt. nat X 222) that
"he had used an apparatus very much like
"Foucault's for a long time in his lectures." This
is doubted. Jaffard brought Respighi's 1849
p. 213. 1867 XIV. 749
Mm. de Rouy. Bulletin de l'E. The arrange-
ment of Mr Foucault has been used
in the numerous pieces of apparatus
constructed since 1849. Having the same
object.

"1849 Mech. Mag Jan p. 50 Vol. 50
"Mr Starkey long and arduous experiments to subdue the lightning from the heavens, &c, are universally known, and we believe we may add highly ~~appreciated~~ esteemed by all who are qualified to appreciate them!" Patents follow. R. 6

"Mech Mag Vol 50 Page 92
"M. le Molt has out somewhat of a figure lately as a claimant for the honor of first adapting E. L. -". All his are old

Pierce of Worcester Mass time and tide with electricity from turning a handle to spring light = 4000 gas burners! for book of Facts 1850 Satisfactory Apparatus to the trade little after a year
Mr. Grove cost &c p. 16

Pronounced a failure by Mr. Rutter Year book of facts 1850 p. 189
Mr Petrat regulator, great cost.
Faraday Brit. Assoc. spoke of imperfect character of E - L and impurities for Illumination

1854
64
Regulator
The Duboscq Dec. 1850
A report on his regulator handed to the Academy Guillemin Applications p. 676 30 - 367
Comptes Rendus
Despretz Communication on the length of Voltaic Arc. longer ~~when~~ ~~generated the~~ vertical than horizontal when + pole is on each arc greater than when it is in the west

Athenaeum p. 1255
Allman light worked well for a time of several hours. Proposal to test the light by giving contract to electric light owners to illuminate one of the parks at cost of gas

Mr. Starkey's new lamp see new page
1849 Paper read by Mr. Ward stating that the cost of 55 Daniells or 29 Grove 60 grains of Zn per hour cost about 8d.

Mollet experimented with incandescent cotton
Jour. Society of Arts Apr 11 1873 p. 399

Jan. 7 1850 Exhibition of Mr. Staite's light. See Mech. Mag. 52 - 35.

This Iridium lamps will do very well for domestic purposes.

As unintelligencer of the light unerring Correspondent says, "There can be little doubt that the day we shall see gas and oil lighting with all its attendant evils of blacks, heat &c. replaced out heart in all large public buildings and thoroughfares by the electric light." Ed M.M. says "It does appear, that all the difficulties have at length been surmounted and an artificial electric lamp produced which gives a steady enduring and most brilliant light without any perceptible flickering or intermission."

Before this public had experienced so many disappointments in the "perfect success" the inevitability towards. We do not hesitate

Staite's Electrical light exhibited at Manchester with satisfactory results. Burned five hours and at one time gave light = 700 candles. The products from the battery were claimed to be worth more than the raw materials so that the light cost less than nothing. Jour Roots of Facts 1855 p. 137

1850 - 65

Photographs taken by aid of the light. Ashby. Central Bluff 1852 - 177

The light introduced into several R. R. tunnels in England

Mining Jour. 1851 p. 553

Without date

Cummer and Jacquelin carbons.

1st filling the carbon with sugar and

and burning and grinding.

2nd forming a retort carbon using

only pure materials in the retort.

1852
66

Allen's spiral electrodes #

Mech. Mag. 1852 57 p. 396

see R p. 13

To show the state of electrical theory even at this date one fact can be mentioned. Mm De la Provostaye and Desains, remarked with wonder to the French Academy, that when a wire was placed between two batteries, of like strength, having their poles placed in opposite direction the wire was not in the least heated. This in spite of the fact that either of itself would heat it. A discussion followed this and it was spoken of as a matter of question whether the two currents could flow at the same time in opposite directions. Liebig Kopp Jahres Berichte Comptes Rendus 36-342

"Mr. Allen introduced a very excellent rotating electrode, formed with a spiral edge, by means of wh a very superior result was obtained

Mech M— 1857 Vol 67 p. 560

1852

Martin John Roberts experimented upon the transmission of the electric current through a continuous thin piece of graphite enclosed in an exhausted glass globe

Jof Soc of A- Apr. 11 1873 p 399

Jufonstmuft 1853

refers to a paper by Crahay giving an account of Lamp Institute, 1853, 337

also refers to Lamp of Jacper of Lilliwich

Pekárek in the Sitzungsberichte of the Vienna Academy, describes a form of apparatus like that of Ackerman.

A core of iron in a spiral governs by means of cords and wheels the distance of the carbons.

Wm. Rand. Rev. XII 263.

Cost of Electric lighting Deleuil

Deleuil Comptes Rendus 1854 p 812

The Napoleon Docks.

The lamps were in operation during four months, and worked very regularly, having a battery of 50 large sized Bunsen cells.

Two sets of apparatus each one costing per day

	for	Unless 1 Pile
Wages	4.50	
Mercury	5.00	5.00
Zinc	4.50	1.40
Carbons	1.40	
Nitric acid	1.80	
Sulphuric ac	1.84	
	19.04	
	2	lamps
800	38.08	
800 laborers	$4\frac{1}{2}$ centimes	

The economy is considerable and the work proceeds without danger and with greater regularity than by any other light

Mr Despretz obtained a changed state of condition on at Rt. pole using a lower power current.

Perhaps diamonds, as they could be used for pulverizing rubies.

Mech. Mag V. 59 — 386

1854
67

Elector & Watson R p. 14.

Jarper R p. 15

Year Book of Facts 1855 p. 190 from The Builder No 623

Mr. Watson of the Electric Power, light and Colour Co. lighting the new bridge at Westminster.

Proposed lighting Champs Elysées

Light = 72 Argand worked quite well. Moniteur Universel

Poly. Central Blatt 1855-p. 375

Proposal for lighting Chelsea bridge ~~for~~ in building, for divers under the water.

Poly. Cent. Blatt 1855- p. 1272

In Rome ~~from~~ on the tower of the capitol a light having one of Jaspar's regulators was tried.

The dome of the Vatican was brightly lighted as if the sun were about rising. Father Secchi tried the light by reading, and found that he could do so at a distance of 700 metres Comptes R XL 839

Machine d Alliance
Bulletin de S— d'C— 1867 p. 690
The idea that prompted S. Co. who gave the money to perform the experiments to build this machine was that ~~the se~~ it should be used for decomposing the H O into gas wh. could be utilized ~~[illegible]~~ for illuminating purposes.

Duboscq's regulator in its improved form. For full account see Karsten's Encyclopedia Vol XX Artgewandte Electricitat before p 1316 70

~~For~~ Serrin the same p 1320

Jablochkoff see R p 8

In England experiments were made on various lights for war purposes. The apparatus for the Electric light took a two horse wagon to carry it through light the tech. Gear Bo of 185

Quemin proposed placing lamps in line alto each other. Light not good Poly Centrad Bo 1856 p. 378

1855

M. Viard Ann. de Chim. et Phys.
(3) T 43 P. 304

Proof that the amt. of heat from a wire depends only on the current passing through it.

Joule Grove had found in experimenting that when the wire was placed in H it rapidly cooled; one explanation was that the H on its surface helped it conduct the current, another was that the H could easily take up the heat from the wire and thus induce its resistance, more current could pass and the ~~wire~~ heat developed in other parts of the circuit. If the same amount of heat was developed in a given amount passing through the Pt in H as in O Second explanation proved

Clausius Pogg. Ann. 87 – 501. explains this phenomenon with equal truth of conductivity and absorbing power of gases &c.

1856 71

At the crowning of the Emperor Alexander in Moscow Aug. 1856 eighteen electric lights were placed in the Bell towers of the Kremlin. The system used was that of Prof Yablochkoff of St Petersburg & it worked so well that the lamps worked perfectly for 4 hours and a half, and only two of the eighteen needed to be substituted by hand. Bulletin de l'Acad 40 Kops each Daniell lamp cost 1860 p. 197 see R p

Father Secchi of Rome, made in this year, a series of experiments to test the practicability and the cost of the Ex. R – for lighthouses. The expense of the various batteries was formed, 30 Bunsen cells cost 6½ Thalers, and could be used for eight hours. The Bunsen form was much better than the Daniells though that cost 5 Thalers.

The cost for the light must greater than the ordinary oil-lamps, while the unpleasant trouble as impurity of the carbons would break the light. The cost would be at least for each night 6 denrdie. Finally the light is not so strong as to do away with mirrors or lenses in order to concentrate it." Therefore after all. the hope does not seem as yet arrived, that this agent can be used as an economical means of producing light.

Berlin Jaresberichte XII. p. 463
from Cimento IV 321-396

Proposed to use under H.W. to attract fishes at night Poly Tech. 141-400

Hall lighted Mech Mag. 67-250

1887
72

light houses see p. 21

Forbidding experimenting

Great Eastern launch proposed for

Mech Mag 67-559
a summary entitled The Electric Constant Light.
If continuous motion given the light soon extinct. Passing current only governed on cessation of current very inconstant, fluctuations varying with friction.
Use of disks abandoned because of liability to crack or fly
magnet from expansion. Then speaks of Harrisons new light at
pencil and cylinder of carbon.
as being good and tried for

Used in Dunkirk for fishing the carbons placed in a glass globe. fishes swam round the lamp.

Jour. Socie. of Arts 1869. 757

Dr. Watson used his light to light the work on Westminster Bridge 1858 = 72 Organic humours. Eminently successful. "It should be added that the new light was subject to a transient and occasional flickering or fluctuations of electrical force, inseparable from the operation of so subtile an agent." Year Bk of Sc 1859. 73

Cost nothing products valuable!

Mr. Lindley read paper Society of Arts March 3 on E.L. the recent great hope had been felt of Mercer Station and Petrie. Kurrian light very good. Mr. Holmes introducing light in light house Mec Mag 68 L 252

Mech. Mag. 68 – 36 Letter from Mr Chapman on E. L. & Ealing what had been done and claimed regulator — not very good.

M. M. p. 48 1857
74

Harrison E. L.

The Way E. L. only gave about ½ of the light of the carbon points and was subject to a painful flickering. The vapor from the carbons at last failed. Mr. Way. Scien. Amer. VII-279

Pelbumann et Faure

Cost for 15 times C

Thermal equiv $\frac{1}{14}$ C

For burning 14 X 15 = 210 more costly than nothing of the acids.

Light House p. 22 1860

A paper Prof Faraday, Royal Institution March 9, 1860.

Summary Year 3 — of 7 1861 & 86

The great advantage in the diminished size of flame allows it to be refracted by small glasses.

A summary and account of the light in the light house at Tourbet Finland

Poly. Journ 157 - 113

Fröchting Pogg. Ann. CIX 182.

new regulator iron stem and magnets no cut

1861 The electric light used in several places in Paris at an alleged lower cost than gas
Yearbook of S. – 1862 p. 170.

Mun. Targe Counter Reading 52 – 375. 413
Spirits of success attending ~~the~~ ex-hibition at the Tuileries. Engaged for light house. To avoid ~~the glare~~ glare from the lamp engaged a hemisphere over them ~~having~~ upper part a mirror lower ground glass

O photometre of M. Becquerel
Annales de Ch – N P. 62 - 14.

1862
76

Lantern was ~~a~~ simply a ~~[illegible]~~ laboring observatory who in odd moments amused himself in making an electric lamp. Societe d'Encour. 1862 – p. 273
Gramme cabinet maker.

Note on cost of lighting with Serrins on R.R. work in Spain Bulletin de Soc. d'Enc – P. 373. Light had been used for 12 hours and worked well cost per hour for 40 lamps 2.kr 81

Serrin Comp. Rend 54 – 741
claims only an oscillating system

~~Elec~~ E. permanently fixed June 6 in the Dunnigenes lighthouse

E. L. has the power of affecting the growth of vegetables Scien Vol V p. 181

Hervé Mignon Hervé Mignon ..

M. Becquerel estimates cost of light as follows.

Gas costing $\frac{30}{100}$ for cubic metre
17 cts 100 cu. ft.

oil of colza $1.28 per gallon
Tallow in form of candle 16 cts per lb.
stearine 36 "
wax 52 " " " "

Cost of E-L - simply materials
90 candles per hour
Le Produced by machine 264 cts.
Galvanic Battery 386 94
Coal gas 62
Kerosene 73
pure oil of Colza $1.14
Tallow candles $2.37
Stearine 5.00
Wax 6.10
Popular Science V 720

Interest expts, labor &c left out of account in E. L cost only fuel considered.

U. S. Commission 1867 III 452-5
These figures Dingler 217 - 3.11

Adopted for a light on Cap de la Hve near Havre and working well.

Advantages when the weather is half misty it pierces immense penetrating power, and only costs one third more wh. in comparison to the cost of the light and interests involved may be neglected. Ann. de Tel. VI 369.

Parliamentary paper on E. L in light house stated that it cost $3.620 per annum. Only extinguished twice in 9 months for ten minutes and 30 seconds.
Scien Amer X-49

Bulletin de Société d'Encour.

Mm. Dumas Bulletin d'Soc. No. 6. 473 1869 78

"How can one help attaching an extreme importance to this extraordinary production of a luminous point, which, without consuming of material and without chemical action, ~~is can contend with~~ is superior to that ~~from~~ which 200 or 250 carcel burners are able to produce, that is to say 1500 or 1800 candles, and concentrated in the small space that one occupies."

Lavoisier, in his memoir of the lighting of the city of Paris, makes the remark, one hundred years ago, that it would be necessary to have very many small lights in order to light well a city and not those of great power and few of them.

But in mines, tunnels, lighthouses, for military purposes

the light could be used without this trouble if a suitable method of regulating could be found. Mm. Foucault remedied the fault partly by substituting ~~gas~~ carbon from the gas retorts, and Mm. Jacquelin a prepared carbon.

There was wanting a regulator for the apparatus, and Mm. Foucault who the principle in the following combination: the current which produces the light traverses in its route the turns of an electro magnet, and communicates ~~it~~ magnetism to it. One sees this from this, that if the communication ~~of~~ between the carbons is established, the luminous arc is intense, and the current passing through

Mm. Dumas, the conductors, the magnet ~~too~~ has its full power. If the cartons separate, the light is enfeebled or extinguished, the current is weakened or broken, ~~and~~ the magnet loses a part or the whole of its power. But then a contact which the magnet holds is broken causing the carbon to approach, and the current as well as the light are brought into play another time.

Mr. Stiele solved the same problem mechanically.

Mm. Serrins regulator very successful; Dubosq also with Mm. Foucault. It is not the first time that Mm. Foucault has been able to say the first and the last word on a difficult question.

~~Dumas~~ Bullet. de l'Ac. Sc. Cu. XI. 474 1864

81

Splakes of Electro Magnets

Light used Lorient France
Sciar. Amer. XI 275

Edlund shows how the total heat of induced current and main current follows the law of intensity squared
Pogg. 131-337

Edlund. An electromotive force exerted in the arc in the contrary direction. Pogg. 131-586

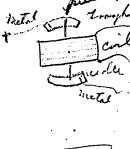
Dec. 26. 1863 the electric light established with phare de la Hive. After two years crowned with success. Nov 25 1865 second light. Then apparatus of Mm. Sérin worked most admirably. It had been employed in very many works and always did well. 17000 hours.

M. Razin tried the electric light to fish by and found it very successful. He was ~~put in~~ given a government vessel to use in trying experiments to try experiments at coral fishing in Algeria.

1867

Kohlrausch Poggen 132 - 266

A self acting regulator for the galvanic current. A needle has attached to its ends ~~to~~ pieces of metal dipping into a fluid through which the current must pass. As the needle is deflected by the current which passes round it the plates in the fluid are moved and resistance changed



As the needle moved the resistance was greatly changed

see page 15 M

1867

84

Used on yacht of Prince Napoleon and skating pond Bois de Boulogne. ~~Growing accustomed to it every day.~~ M. Serrin ~~regulators used~~

Mech Mag XVII p 84

The E. L. from Wilde's machines said to be more powerful than sun light

Scien. Amer XVI 248

Mr. Farmer's estimates as to the cost of the light see S & 15 from Scien Amer.

The E-light was placed on the bottom in New York for a short time this fall, using a third class Gramme dynamo to project it Scien Amer XVII

Edlund shows that a Pt. wire expands more for stronger current than a weaker one though the temperature of the wire is the same Poggen. 131 - 337

The St Laurent showed mightily the electric light. It was said to cost about ten cents an hour
Scien. Amer. XIX – 250

The cost is estimated in Pop ickaw Science Monthly V 723
as 56 cts per hour

In the report of the U. S. Commission on the Paris Exposition for 1867 by F. A. P. Barnard a fine account is given of the E. L. in the French light houses and the cost &c, with figures as to its value. Vol III p. 415

Edlund gives an account of the measurements of the polarization of the arc. Poggen. 134 – 250

Mr. Carré's proposed ~~[illegible]~~ and improvement in the carbons 1869
~~[illegible]~~ by soaking them 86.
in certain saline solutions. The
light from such carbons was to that
of the ordinary as 1.68 to 1,
M. Jamin J Bulletin de S- de E-
XVI 269

Mr. Carré was the inventor of the
process of making ice artificially

In Sept. Mr. T. Stevenson C. E. engaged
in the project of illuminating buoys,
with the E-L. J. of S- of A 2 April 1873

The electric light used ~~only~~ both the Germans and French during the war. Particulars as to the distances illuminated in Jour. Society Arts Nov 18 1870 1770 By

Used in sending signals from Wales to Ireland for surveying Mar Mn. Vol 24 p. 202 proposes that harbors should be lighted with Electricity

Pogg 140-337 account of the effect that the surface has on the radiation of heat from bodies

An account of E.L in Jo of Sc A 1872
& Mpo 4 & 11 1872 p. 381 398 89
He says an inventor is trying by using
heated carbon to obtain E.L and that
the mains of the gas companies will con-
ve used for conveying the wires
E. L like artificially Sun light.
"It is most probable that the adop-
tion of the continuous conductor
principle will admit of two or
more E-L on the same circuit.
Most certainly if this invention becomes
in very deed and in practical work-
ing an accomplished fact, our arcad-
ody will be carried out, and we
shall have our houses and streets
with a light wh. in a philosoph-
ical as well as a practical sense
is truly described as artificial sun-
light."
Light with the Drummond machine
used Westminster bridge.
proposed clock tower Parliamentt A.
Jo of S. of A. Ptgl. 21 p 179
account of Konkoff light in
St. Petersburg

Used in Clock tower of Parliament
Picture of apparatus Scien. Amer. XXIX 40

Poggen. 144-467 An apparatus by which the expansion of Hg in a thermometer controls the amt. of gas to a burner, thus regulating temperature.

1873
90

Gas and Electricity used in the clock tower of Parliament. Results in favor of electricity
Scien Amer XXX 372

In the Pop. Science Review Vol. 12 p. 265 a very good account is given of the Gramme machine and of the lighting the tower at Westminster. Mr Werdermann introduced the machine in England. Serin regulator used.

Poggen. 148-424 Theory of the evolution of warmth by the current, Edlund.

Poggen 149-521 Ns direct relation of the amt. of material carried across in the arc to the current.

Poggen 150-368 The alteration in length of a wire by a current passing through it. Streintz.

Ann Lond A. Vol 27 p. 234 1874
91
Poggen. Jubel Band Bunsen Photometer

Prof. Olsson of the Miami Univ. 1878 92
used a ribbon of carbon in air of CO_2 suspended between Pt ~~and Pt~~ posts. From Vol 3-684

Mr. Starr of Ohio invented this lamp, patented by Mr. King in England. Mr. Starr died very suddenly in the act of his experiments. "I assisted him" W. Mattieu Williams.
From Vol. 3-684

1859
C. H. Hasenstein. Das electrische Licht. Weimar B. F. Voigt
p. 1–194 nebst 15 Tafeln

Holley Handbuch Chem. Technol.

Jahresbericht des physikalischen Vereins zu Frankfurt
1866.9 bis 65 5.75

an account of a regulator for the arc-vent

Clark account of E. L in light houses

1857 Archives Phil. Nat.

Cosmos

Archives d. sc. phys
Recherches sur l'éclairage électrique
Thivoy
36-310

Wartmann Sur l'éclairage électrique
36-323

E. Becquerel Elairage électrique
Cosmos X 417

Lumière Electrique
Du Moncel Exposé III 216-287

Poly tech Mitg Blatt 1857 - p. 84
lighting Elysian fields

Fortschritte der Physik after
1856

List of authorities not in Astrom

Baseler Verhandlungen II p 311
Göllner light from Pt. wire (P.7)

Archives d'Electricité very many
references from De la Rive Vol 1-1874
especially Fizeau and Foucault
Electric Light & IV p. 811

Cincinnati Magazine for account
of lighting cities by Electricity. 1
Yale book 1846

Electrical Mag. Jan 1845
account of how to light towns
with Elec.

Institute No. 960
account by curtest

Rutter Gas lighting London 1849
account of Davis' in gas etches

Gmelin Handbook
Vol 1 p. 392, 421.

Institut 1853 - 337 account of a
regulator by Crosby

$$\frac{\mathcal{E}}{(R+r+r')-s} = \frac{\mathcal{E}'}{R+r'}$$

$$\frac{\mathcal{E}}{R+r+r'} = \frac{\mathcal{E}'}{R+r'}$$

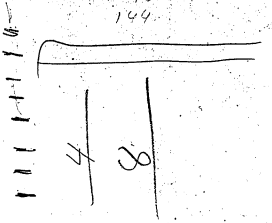
4 hours 4.0.0

9 1200 $\frac{1}{3}$

36

16

144



Jablochkoff. C.R. 83 - 813 - 1876

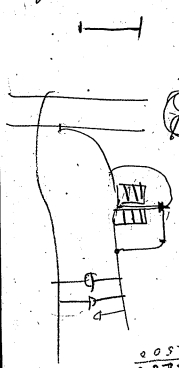
84 750 - 752

84 137

84 288

84 346

84 914



Dingler 224 - 494

Les Mondes

1877 - 44 - 412

977°

32

91945

105

5

585

0.052

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73125

00.0.52 (92

0.52181

0.5

0.51

0.5

-18

0.18

0.91

0.91

0.9

Use of Belting Cooper
$2.75 looks good

Palaprat translation Lebaume
Pt. wire for cauterizing.
Chapman's patent how vulcanized to brass

Silliman's Journal E. L in
Boston 1862 or 63
Amer. J. of Sci and A. Letter.

Nature account of E. L in
lighthouses
U S Commissioners report for
1867 light house

M. Bouquerel on electrical
apparatus in Paris 1862
Faraday's life Gladstone

Comptes Rendus Dec 2 1872
account of Gramme Machines

M. C. Close has an account of the lighthouse experiments in England

Outlines for history

by Abramson — Heating substances

Page 40 — Recommend of heating substances

Courtesy
M Flader 1845. cu. p. 2
De La Rive Vol III 684
Michelschorff p. 2

Strange things
Burning gas from decomposition p. 4 H
p. 5 H
Electric explosion &c p. 43 H
Weeks burning plates p. 57
Lightning drum 59

Applications Guillemin app-
first G Cargo work reconstruc-
ting the Notre Dame Bridge
in Paris. Opera. During
the war at Mt. Valerian.
Ships Transatlantique. Future
for Miners with features for
all

E6285N N-(78-11-1612)

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Materials for Carbons.

Outline for History

E6285-N

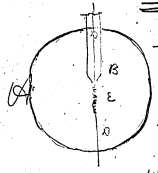
Note Book

1.8.41 1

De Malyns No. 9053

He says the usual mode was —
Rat. charcoal pts. or one thou and pt. wire, contact made in vacuo or atmosphere; are ceased after few moments

His invention C powder in contact with wire pt wire
A Glass globe for vacuum



A Wires D of Cu leading to pt spirals E, which may be made whilst hot when contact is made. A piece of spongy pt. is placed on ~~top of the~~ one of the spirals to facilitate this. The tube B is filled with Charcoal or platinoid powder which falls through

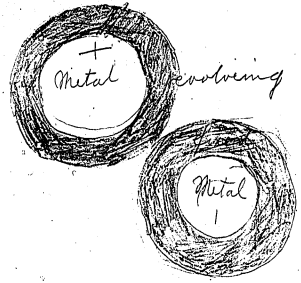
the spiral and is thus heated.

~~He~~ says a light "pure and intense" is obtained by this means

Mechanics Mag
Vol. 36 p. 236

1845 March
Wright Thomas No 10,548

~~Claes~~ Rotating a circular disk of carbon against another
Claims method of presenting continually one or more fresh pts. or surfaces of C.
~~or of~~ to the path of the
Electric light



London Journal Vol 31 p. [illegible]

E. and A. J. Vol 11 p. 355.

Fontaine p. 17

This is probably what the Lum Lamp response to of Nov 21 Dec 2, 1878

The writer probably refers to the invention of Starr in 1848, where the poles were regulated by clock works controlled by a magnet.

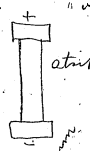
1845 No 10,919 4

As said by the Plan

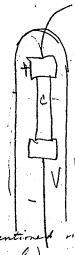
King for Starr. of U. S.

Claims application of continuous metallic and carbon conductors intensely heated by the passage of a suitable

No regulator mentioned claims "only strip of Pt. or C. intensely heated."



"Jornalier" "machine"



Carbon in Barometer Vacuum

This patent is mentioned under date of 1848 in (Gas Mag Journal) Nov 1878 as giving a strip's invention ?

1846 Greener and Staites 11,076

"Prisms or cylinders divided on the surface into numerous acute points, or by means of ~~of~~ rods or strips of Pt."

Points on surface given with some

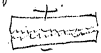
Claims — "The employment of carbon or Pt. or any other like difficultly fusible metals in solid prisms or cylinders divided on the surfaces into numerous acute pts. or other forms so as to present numerous acute pts." like Wallace Comp?

"By opening two such assimilated surfaces, the one to the other, we obtain the advantage, that should the electric current between any two pts. (as happens frequently in the ordinary mode of igniting C by E — when there are only two pts in opposition) the currents will be kept up by the remaining pts and the light so maintained without any material interruption or abatement."

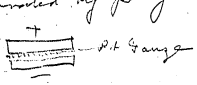
1846 Greener & Staites 11,076

No drawing.

~~Hollow~~ Prisms or cylinders of carbon in contact with surface roughened



Separated by pt gauze



Cone in hollow cylinder

Both of carbon or either of Pt.

Method of preparing C. by trying with acid.

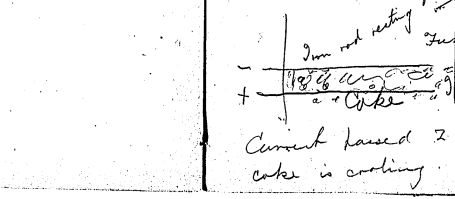
Greener & Stoites.

"This apparatus requires to be in vacuum. Previously no pure C. could be obtained ∴ glass ~~[illegible]~~ covered with black.

Method of preparing C —

Churches Patent for coke and coke ovens &

Eler.



Current passed 7 hours when coke is cooling.

claims that 11/12 impurities removed

Greener & Starlite digest the C in Nitro Muriatic acid wash, neutralize, wash. Hydraulic press into shape.

Then heat, intensely 24 hours. Finish with sand

London Journal Newton Vol. 29 P. 157
Mecha. Mag. Vol 45 p. 160
Pat. J. Vol. 1. p. 216.
E. & A. J Vol. 9 p. 285.

For Jabez Church see

Repository of arts Vol 8 p 224

M-M- Vol 45 p 121

P M J Vol 1 p 204

P J Vol 1 p 77

E & A Vol 9 284

No 11,449 gives improvements

Powder of coke and coal

mix. Heat and compress.

Plunge into concentrated solution

~~of sugar~~. Dry and heat very

L. J. Vol 33 p 390

P. J 2 886

Palaprat trans
Lobaccine
Pt. wire for carb
pyro.

Chapman's patent
in relation to
tanning

Gillinwater Jr
E. L. in Boston
1862 & 63

Amer. J. of Land Ch.
1868 assumed of E. L.
Boston.

1847
Steele No 11,783

Plunges Carbon into melted
sugar instead of solution of

12,272

Plumbago washed acids
Lampblack
Charcoal powder
Gas coke

Mixes with brown sugar
enough to form paste [illegible]
Mixture melted and [illegible]
until stiff. [illegible]
hot into moulds, the inside
of wh are lined with plaster
of Paris to prevent mixture
adhering and allow gases
escape. Moulds heated
gradually until dry
and then to red heat
[illegible]

Nature account of E. L. in Light houses

U. S. Commissioners report for 1867

M. Becquerel on electrical apparatus in Exhibition of 1862

Steele 1847 No 11,783

Plunges Carbon into melted sugar instead of solution of

12,272

Plumbago weaked acids
Lampblack
Charcoal powder
Gas coke

Mixes with brown sugar enough to form paste [illegible] Heat. Mixture melted and [illegible] until stiff. [illegible] poured hot into moulds, the inside of wh are lined with plaster of Paris to prevent mixture adhering and allow gases to escape. Moulds heated gradually until dry and then to red heat [illegible]

Stuart 12,212

M. M	Vol 50	p 49-73
Artizan	" 7	26
P. J	6	146
E & A	12	53

~~1848~~

Le Molt 12,219

Two discs at right angles
clock work

✓

France 1849 16-223

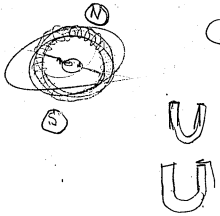
K of A	Vol 13	p 156
L J	34	31
M M	50	91
Artizan	7	132
P J	6	153
E & A	12	80

1853 634

State

Rail C – in oil fuel

and tubes



308.2
32
9) 3050
340
5
17000 Cent. from A

150
100
9
5

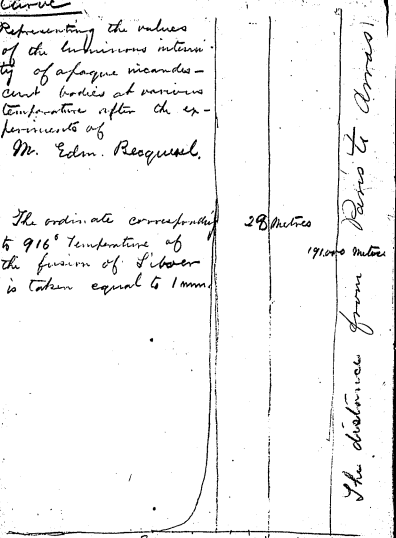
H & R.

Curve

Representing the values of the luminous intensity of a opaque incandescent bodies at various temperature after the experiments of

M. Edm. Bequerel.

The ordinate corresponding to 916° Temperature of the fusion of Silver is taken equal to 1 mm.



M. Edmond Bequerel has ~~sought~~ sought in one of his principle works to fix the value from the various sources ~~to~~ of light and at the same time their luminous intensity. He could do this directly up to a temperature of about 1200° cent. These are the results of his experiments

Temperature	Intensity of light
500°	0.0
600°	0.00 3
700°	.02
800	.13
900	.75
916 silver melts	1.
1000	4.
1037 gold melts	8.
1100	25.
1157 copper melts	69.
1200	146.

By an empirical formula supposing that it will hold for higher temperatures one obtains

1500°	28.900
2000°	191.000.000

or 2000° is approximatively the temp. of the Voltaic arc, which

had also been concluded by M. Becquerel from comparison with a Darell lamp.

These numbers show that towards these high temperatures a slight change in the temperature will cause a great variation in the intensity of the light emitted, especially near 2000°. That is it varies $\frac{1}{10}$ of its value for a variation of 23° Cent. 10° added will double the intensity of the light.

Without doubt there is not an absolute certainty in these results, for they suppose that certain laws exist outside of the limits for which they have been proved.

If ~~two~~ one imagines two surfaces of equal area ~~that~~ one mm. square for example, one of them illuminated as strongly as the brightest part of the voltaic arc, the other covered with a coating of fused silver, the first will give out 191,000,000 times more light than the second.

It must be distinctly understood what is said. 191,000,000 to one ~~approximately~~ is ~~found~~ the arc that generally is ~~found~~ has a surface towards one side of about 1 mm. square.

Imagine a surface of 1 mm. square of fused silver placed ~~covered~~ centimetre from a screen ~~the~~ and find how far a source of light of the same size must be placed to illuminate the screen to the same extent as the illumination varies

inversely as the square of the distance, it will be at a distance = $\sqrt{191,000,000}$ or 13,000 centimetres, or 138 metres which does not seem improbable, and this result offers nothing of the paradoxical!

This is taken from one of two very fine lectures on Electro Magnetic Machines and the E-L in light houses by M. ~~[illegible]~~ F. P. Le Roux to the Société d Encouragement 1887 page 748

Annalles de Physique et Chimie
Vol 6 8-4 ~~49~~ - 143
49-143

Outline for History

A short account of the discovery long ago being the sensitive instrument.

Voltaic. Arc

Davy quite full
an account of what it is
Theory like

Date of Grove
Bunsen
Regulations follows new lights account

See next page

Probable that Pt fuses between 1560° and 1580°

5 | 1560
312
9
2808
32
2840

Palladium
1460° 1480°

Iron 1450° 1500°
not exact on account of the oxide forming on the surface.

Beaguerel Annalles de Chim et P.
68

Carbon arc
2070°

~~Heating~~
~~Discovery~~
Heating substances
Beaguerel

Intensity of light	Temperature deduced from the light emitted
0	500°
1.013.	972°
2.321.	1050°
21.630.	1260°
41.625.	1321
58.695	1354
145.835	1440
205.510	Melting Pt

and probably much higher